

REMARKS

Rejections Under 35 USC §103

Claims 1-20 and 42-44 have been rejected under 35 USC §103(a) as being unpatentable over Krall (US Patent No. 4,713,235) in view of either Chorbadjiev et al. (article entitled "The effect of fillers upon properties of electroconductive cyanoacrylate adhesives from the International Journal of Adhesion and Adhesives July 1988), and either Loctite 410 or Loctite 416, further taken with the state of the prior art as exemplified by at least one of Liang et al. (US Patent No. 5,233,131), Fogal et al. (US Patent No. 5,140,404), Farnworth (US Patent No. 5,218,229) and German Patent 4107347.

Claims 21, 22, 40 and 41 have been rejected under 35 USC §103(a) as being unpatentable over the admitted prior art in view of JP 58196280.

The 35 USC §103 rejections are traversed for the reasons to follow.

Claim Amendments

The pending claims are directed to a "method for packaging a semiconductor die". Each of the independent claims has been amended to include additional recitations which further distinguish the invention from the prior art.

Independent claim 1 recites the step of "providing a die attach machine configured to align the die to the leadframe, to apply the adhesive material to the leadframe or the die, and to press the die and the leadframe together with the adhesive material therebetween". Claim 1 also recites an "applying" step and a "placing" step "using the die attach machine". Antecedent basis for these recitations is contained on page 9, lines 22-32 of the specification.

Claim 1 thus defines an automated semiconductor packaging method in which a die attach machine is used in combination with a cyanoacrylate adhesive, and without a heating step, to attach a die to a leadframe. Although die attach machines are known in the art, they are conventionally employed with polymer adhesives that require heat curing in a furnace. In addition, although cyanoacrylate adhesives have been used in the electronics industry (Krall and Chorbadjiev), cyanoacrylate adhesives have not heretofore been utilized with a die attach machine in a semiconductor packaging method. The present method provides a process advantage in that a conventional die attach machine can be employed, but without the requirement of a heating step using an oven or furnace.

In assessing unobviousness the Examiner is asked to consider the differences between the prior art and the claims "taken as a whole". In the present method there is a new and unobvious functional relationship between a semiconductor die, a leadframe, a cyanoacrylate adhesive, and a die attach machine.

Independent claim 6 recites the step "providing an in line dispensing mechanism configured to apply the adhesive material to the leadframe or the die". Claim 6 also recites an "applying" step "using the dispensing mechanism". Antecedent basis for these recitations is contained on page 7, lines 23-26 of the specification. As with claim 1, claim 6 defines an automated semiconductor packaging method in which an in line dispensing mechanism is used in combination with a cyanoacrylate adhesive, and without a heating step, to attach a die to a leadframe.

Independent claim 12 is similar to claim 1 but states the leadframe includes a "mounting paddle", and the adhesive material is applied to the "mounting paddle using the die attach machine". Antecedent basis for these

recitations is contained on page 7, lines 17-20 of the specification.

Independent claim 15 recites the step of "providing a system comprising a leadframe feed mechanism configured to manipulate the leadframe, a vacuum tool configured to manipulate the die, an alignment device configured to align the die to the leadframe, and a dispensing mechanism configured to dispense the adhesive material on the leadframe or the die". In addition, claim 15 recites an "applying" step "using the leadframe feed mechanism and the dispensing mechanism", and a "placing" step "using the vacuum tool and the alignment device". Antecedent basis for these recitations is contained on page 9, lines 27-35 of the specification.

Independent claim 21 includes recitations similar to claim 1 (i.e., die attach machine and applying and placing steps using the die attach machine), but with the "adhesive material comprising an anaerobic acrylic".

Independent claim 42 includes recitations similar to claim 1 (i.e., die attach machine and applying and placing steps using the die attach machine), but with the leadframe comprising a "lead-on-chip leadframe comprising a plurality of lead fingers". In addition, claim 42 recites "wire bonding" and "encapsulating" steps.

Conclusion

In view of the amendments and arguments, favorable consideration and allowance of claims 1-22, and 40-44 is requested. A Petition For Extension Of Time is being filed concurrently with this Amendment. Should any issues remain, the Examiner is asked to contact the undersigned by telephone.

DATED this 11th day of June, 2004.



Respectfully submitted:

A handwritten signature in black ink, appearing to read "S. Gratton", written over a horizontal line.

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June 11, 2004
Date of Signature

A handwritten signature in black ink, appearing to read "S. Gratton", written over a horizontal line.
Stephen A. Gratton, Attorney for Applicant